

**Office of National Marine Sanctuaries/National Centers for Coastal  
Ocean Science Long-term Agreement (ONMS/NCCOS LTA)**

**2004 Annual Liaison Report on Existing and Potential ONMS/NCCOS  
Collaborative Studies at Fagatele Bay National Marine Sanctuary  
(FBNMS)**



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## **INTRODUCTION**

Collaborative studies between the National Centers for Coastal Ocean Science (NCCOS) and the Office of National Marine Sanctuaries (ONMS) are underway in most of the 13 sanctuaries and the Northwestern Hawaiian Islands Coral Reef Ecosystem Reserve. An important part of the evolving ONMS/NCCOS collaborations is to determine how best NCCOS skills and expertise can be used to address sanctuary and Reserve science and management issues. To meet this goal, NCCOS liaisons to the 13 ONMS sites and the reserve are charged with preparing a report to document the status of collaboration at each sanctuary site at the beginning of each fiscal year. This report contains information on the research activities and capabilities of NCCOS, current science efforts and needs in sanctuaries, an assessment of overlap between NCCOS capabilities and ONMS needs, identification of areas where greater efficiencies in scientific activities could be made, research gaps, and recommendations for pursuing collaborative efforts on new or existing projects. This report will provide guidance on improving current NCCOS research at each sanctuary site and recommend areas of future collaboration. The goal is to provide a concise, easily digestible report on existing and potential overlap between sanctuary needs and NCCOS capabilities. The following report addresses these considerations for FBNMS.

## **APPROACH**

The report's primary content is presented in a simple tabular format to allow easy cross reference between sanctuary needs and NCCOS capabilities. Where sanctuary needs and NCCOS capabilities overlap, this tabular format allows easy identification of existing projects. More importantly, areas where overlap occurs but projects are lacking are identified and noted as topics for potential collaboration. Following the Needs/Capabilities summary table, existing and potential projects are then summarized and contact information provided to foster discussion and proposal opportunities for the next ONMS/NCCOS funding cycle in FY2005. More detailed information on each sanctuary and NCCOS Center is available on the internet and will not be presented here.

Table values were obtained from several documents and through consultation with ONMS and NCCOS staff. Entries under the field, "Sanctuary Science and Management Needs", were drawn directly from the July 2002 report on Sanctuary Science by Gittings et al. In that report, science needs and their corresponding management issues for each sanctuary were tabulated according to relevance and adequacy of current studies. Topics recommended for additional research are focused on in the Gittings et al report and receive similar focus here to emphasize adequacy of current ONMS/NCCOS studies in Sanctuaries and identify areas of potential collaboration. Table FB-3 of that report identifies key issues that require additional study at FBNMS. These issues were condensed and used as a starting point to identify Sanctuary Science and Management Needs in Table 1 below. This list was then reviewed and supplemented by liaison and sanctuary staff to reflect needs as of FY2005.

Entries under "NCCOS Capabilities" were obtained from the NCCOS website and liaison knowledge of NCCOS. This list includes only relevant NCCOS capabilities that are related to FBNMS needs and is not intended to be an exhaustive list of NCCOS expertise.

Entries under “Existing Projects” were generated from liaison knowledge and then reviewed by sanctuary staff. While it is recognized that many organizations and academic institutions outside of NCCOS are involved in science activities at each sanctuary site, the focus of this report is on improving ONMS/NCCOS collaborations. Entries under “Potential Projects” occur where sanctuary needs overlap with NCCOS capabilities but no project exists. Field entries here are generated by liaisons and serve as a flag to alert NCCOS and ONMS staff to “missed opportunities” and encourage future discussions between the relevant NCCOS Center and FBNMS staff.

**Table 1. Fagatele Bay NMS Needs and NCCOS Capabilities**

Sanctuary Science and Management Needs	NCCOS Capabilities	Existing FBNMS/NCCOS Projects	Potential FBNMS/NCCOS Projects
<b>1. Biological Resources:</b> Pertinent information on species of interest and biological communities. Ecological indicators, multi-species relationships, key-stone species, stress indicators, competition, predator-prey relationships, recruitment, and habitat use by life stage.	CCMA: Biogeographical assessments of species distribution by life stage. Habitat Suitability Modeling.		Biogeographical Characterization of FBNMS, Per July 03 Allocation Memo a biogeographic study of Fagatele Bay is to begin in FY05
<b>2. Event Response</b> Ecological modeling for prediction of event path, cause, and response, impact identification, contingency plan, and risk assessment.	CCMA: Ecological forecasting and modeling of changes in species distribution due to environmental perturbation. Habitat Suitability Modeling.		
<b>3. Harvesting</b> Effects of fishing/harvest on predator-prey dynamics, effects of global warming, El Nino, hurricanes, and currents on harvested species, condition and trends of critical habitat, multi-species relationships, competition, recruitment, food requirements, life-history information, Distribution and abundance of fish by life stage, by-catch data, predator-prey relationships, catch at age statistics, habitat impacts from fishing, spatial and temporal information on CPUE for commercial and recreational fishers,	CCFHR: Fishery species responses to exploitation. CCMA: Habitat Suitability Modeling. CCMA MPA effectiveness studies		Expand planned FY05 Biogeographic Study to include assessment of fishery resources inside and outside of FBNMS based on new data collection and synthesis of existing information.
<b>4. Industrial Uses</b> Identification of sources of invasive species.	NCCOS: Alien species early detection and warning system, member of the Aquatic Nuisance Species Task Force		
<b>5. Mapping Capabilities</b> GIS compatible data: Shoreline. Habitat Maps	CCMA: Remote sensing and mapping capability using satellite and aerial photo techniques. CCFHR in-situ characterization of benthic habitats	CCMA: Using IKONOS Satellite Imagery to map benthic habitats and shorelines of American Samoa.	Integrate IKONOS based habitat maps with habitat maps underway by Oregon St U. to develop shallow and deepwater habitat maps.
<b>6. Oceanographic Regime</b> Temporal variation of oceanographic data (e.g. currents)	CCMA: Remote sensing of oceanographic features including ocean color and temperature from several satellite platforms.		Conduct oceanographic characterization study by providing climatology of remotely sensed physical oceanographic parameters.
<b>7. Restoration</b> Valuation of sanctuary resources, assessment of restoration technologies for physical structure	CCFHR: Damage and recovery models for seagrass communities. CCEHBR: habitat restoration research at the Oxford Cooperative Lab.		
<b>8. Water Quality</b> Spatiotemporal influences on water quality, non-point sources, rivers, outfalls, and incident vessel contaminants.	CCMA: Sediment contaminant studies, National Status and Trends Program. CCEHBR: Chemical contaminants studies and environmental quality. Marine toxins and Harmful Algal Blooms HML: Ecotoxicology and environmental chemistry expertise.		Conduct water quality studies todetermine relationships between nutrient input and the distribution of coralline and non-coralline algal species.
<b>9. Wildlife Disturbance</b> Response of species to disturbance, spatiotemporal patterns of disturbance, verification of cause and effect, threat identification and response prediction.	CCMA: Ecological forecasting and modeling of changes in species distribution due to environmental perturbation. Habitat Suitability Modeling.		Develop ecological forecasting models of potential biological impacts from increased nutrients and/or pollutants into FBNMS.
<b>10. Zone Performance</b> Type, intensity, and spatial distribution of human impacts within zoned areas; identification of the effectiveness of zoning regime.	CCMA: Biogeographical characterization of resources by management zone. Evaluate effectiveness of MPA boundaries		Characterize status of living marine resources in FBNMS relative to American Samoa waters.

## **SUMMARY OF EXISTING FBNMS/NCCOS STUDIES**

Currently no existing studies are funded to conduct joint work in FBNMS under the ONMS/NCCOS partnership. However, NCCOS/CCMA has completed mapping of shallow-water benthic habitat maps for the sanctuary under the NOAA Coral Reef Conservation Program. The map products are a component of the American Samoa benthic habitat map as part of the NOS/CCMA/Biogeography Program Coral Reef Ecosystem mapping studies. To view map products please see <http://biogeo.nos.noaa.gov>.

## **SUMMARY OF POTENTIAL CINMS/NCCOS STUDIES**

### **Sanctuary Management Endpoint #1: Biological Resources**

NCCOS is projected to begin a biogeographic assessment of the FBNMS in the fall of 2005 (contingent on funding). The planned biogeographic assessment would synthesize existing data bases, primarily on coral and fish, to formulate species distributions maps to aid in sanctuary monitoring studies. This effort could be combined with habitat and water quality mapping to develop a geospatial data base on the distribution of benthic and pelagic habitats and the relationships to living marine resources within and outside the sanctuary.

### **Sanctuary Management Endpoint #2: Event Response**

In the event that an event response (e.g., oil/hazardous material spills) is eventually needed, as evidenced by an event (such as the eventuality of a vessel grounding, or harmful algal bloom), NCCOS should stand poised to help respond as needed.

### **Sanctuary Management Endpoint #3: Habitat**

Research on various aspects of submerged aquatic vegetation (SAVs) ecology has been ongoing at NCCOS's Center for Coastal Fisheries and Habitat Research (CCFHR) for 20 years. Areas of investigation have included development and dissemination of planting, monitoring protocols, and success criteria, as well as studies to determine the light requirements of SAVs, functional equivalency of restored beds as compared to natural, undisturbed systems, and landscape scale studies regarding the temporal dynamics of seagrass bed pattern and distribution. Although no seagrass is found within FBNMS the NCCOS robust knowledge base could be expanded to develop similar techniques for understanding algal dynamics in the FBNMS. The site has a need to understand algal distribution and abundance in space and time as they relate to water quality. Emphasis would be placed on non calcareous algae, except for *Halimeda*, and coralline algae.

### **Sanctuary Management Endpoint #4: Harvesting**

NCCOS may be able to incorporate this information into the biogeographic assessment planned in FY05.

### **Sanctuary Management Endpoint #5: Industrial Uses**

NCCOS scientists conduct research on both plant and animal invasive species. Working with other research partners, NCCOS is developing a pilot early warning system that will

indicate the early presence of invasive species in Hawaii's marine and estuarine coastal areas. The system will include a searchable database of native coastal species and will be available on the Internet. Future projects will expand the database to include other coastal states, territories, and U.S. possessions, thus building a national early warning system. And as a member of the Aquatic Nuisance Species Task Force, NCCOS studies developing technologies that may help reduce the impact of invasive species resulting from contaminated ballast water.

**Sanctuary Management Endpoint #6: Mapping Capabilities**

The current NCCOS mapping efforts should integrate the in-situ and deep water mapping products developed by Oregon State University. The integrated map product at various spatial scales would provide habitat distribution information throughout the sanctuary.

**Sanctuary Management Endpoint #7: Restoration**

None.

**Sanctuary Management Endpoint #8: Water Quality**

NCCOS currently has the capability to monitor chlorophyll, turbidity, sea surface temperature, and other parameters using remotely sensed or in-situ data collection techniques.

**Sanctuary Management Endpoint #9: Wildlife Disturbance**

Both CCMA and CCFHR have the skills necessary to develop various types of spatially articulated models of resource abundance and distribution. Capabilities range from relatively simple deterministic models to full-blown geostatistical models. CCMA's biogeographic assessment is laying a foundation for this type of work (including the development of potential resource distribution through deterministic modeling), and could easily extend current efforts to include development of robust models to estimate distributional changes in response to disturbance(s).

**Sanctuary Management Endpoint #10: Zone Performance**

NCCOS/CCMA has been conducting pre and post closures on marine protected area throughout US coral reef ecosystems. The approaches and lessons learned could be applied to evaluate the conservation objective of FBNMS.

**Current Research Permits**

Greta Aeby, Hawaii Dept of Lands and Natural Resources. Coral Disease Survey, Research permit to include line laying and collection of coral fragments; 6/1-7/31, 2004

Rusty Brainard, NMFS/American Samoa Reef Assessment and Monitoring Program; Research permit to lay lines and conduct surveys; 2/18-3/1, 2004

Nancy Daschbach, FBNMS manager's permit.

1. Replacement of scientific equipment to monitor water temperature and other water quality parameters.
  2. Small-scale sampling of organisms by students, under the supervision of an individual covered under this permit, for educational purposes.
  3. Participation in permitted activities of other sanctuary users.
  4. Any activity subject to 15 CFR § 922.102(a)(1) through (9) when a necessary part of an emergency response, injury assessment, mitigation, restoration, and monitoring, as approved by ONMS headquarters, consistent with (where appropriate) NOAA Damage Assessment and Restoration policies and procedures.
  5. Laying of transects lines for sampling.
  6. Setting of permanent transect markers into the reef.
  7. Placement of mooring buoys utilizing existing anchor bolts.
  8. Placement of boundary buoys utilizing existing anchor bolts;
- 1/1/2004-12/31/2008

Lara Hansen; Assessing the impact of climate change on coral reef systems, and enhancing management effectiveness of marine protected areas and coral reef species conservation through assessment of mycosporine-like amino acid (MMA) content in populations and genera; Research Permit to allow: Laying of lines and/or quadrants to conduct the survey or to act as guides; Establishing temporary site markers as needed; and, Limited sampling as described in the sampling strategy of proposal 2 to include the collection of small (3cm) nubs of three genera of branching corals not to exceed 5 samples from each genera in any one sample period; 2/20-9/30/2004.

## CONTACTS

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